very much desired. In the driest climates the hail undoubtedly may be more than the rain, whereas in wet climates it is much less. The quantity of hail and of water should be measured separately when possible; taken in connection with the size of the hailstones, and the duration of the hail fall, it gives us some idea of the process going on within the thunder clouds.

MISSOURI.

Severe hailstorms seem not to have occurred, and the heaviest rainstorm was 3 inches in two hours on the 26th, at Avalon. At Rolla a severe hailstorm occurred on the 19th, 9:12 a. m. to 9:26 a. m.; the largest stones were 1.25 inch in diameter.

NEW ENGLAND.

Vernon, Vt., reports an earthquake on the 11th, at 1:25 a. m., which was distinctly felt and jarred the house. This seems to be quite an isolated case, and it is worth inquiring whether this jar was not due to something else than a true earthquake.

NEW JERSEY.

A quotation from the Trenton State Gazette states that a brilliant meteor was observed there on Wednesday evening, June 22, at 10 p. m., illuminating the northwestern sky. It is also said that "the meteor went from southeast to northeast, and left a great luminous streak across the sky, and * * * a thunderous report was heard." These and other items seem scarcely consistent with each other, but we are pleased to note that the report from New England Section states that at Middletown, Conn., at 10 p. m. of the 22d, a handsome meteor passed over this city toward the southwest. It is, therefore, evident that the meteor which passed over Middletown is the same as that observed at Trenton and Paterson. If it was seen to the northwest of Trenton, as seems most likely, and passed from northeast to northwest, instead of, as above described, from southeast to northeast, one might make an approximate computation of its altitude above the earth. The chances are that a bright meteor like this will be seen by many voluntary observers, or their friends. If every one would carefully record the apparent angular altitude and the exact bearing of the meteor at one or more points, say the beginning, or middle, or end, we should have the means of making exact computations which would be of value both to the astronomer and the meteorologist. It is by means of these bright meteors that one has been able to prove that there must be an appreciable atmosphere a hundred miles above the earth's surface, where the barometric pressure is not 0.0001 inch. The light gases at this high elevation must be entirely distinct from the gases that we know at the earth's surface.

The New Jersey report also gives an account of one of the severest thunderstorms ever experienced in that State. It came from Penn, Bucks County, Pa., adjoining Trenton, and struck the latter place about 3 p. m., and for half an hour the thunder and lightning were incessant and terrifying. It passed into Ocean County and the sea shore toward the east-southeast. All residents of the Atlantic States are familiar with the general course pursued by these afternoon and evening thunderstorms. They appear to originate to the westward near the first row of important hills or mountains, consequently on the eastern edge of the Appalachian range. They move eastward with great steadiness. Sometimes the path is toward the northeast, sometimes toward the southeast, but these are rare extremes, the average being toward the east by south. They start as great clouds, growing rapidly in size, and by the time they have moved 20 or 30 miles eastward, viz, within the first hour of their growth, they have begun to precipitate rain. Before that time the lightning and mutterings of thunder have been confined to the bosom of the cloud itself, but after that the flashes frequently strike to the earth, and sometimes strike simultaneously from cloud to cloud for a distance of 20 miles, with flashes to the earth at either extreme. These big clouds, or incipient thunderstorms, do not usually appear singly, but form an almost continuous series, stretching northeast and southeast from southeastern New York throughout the Atlantic States to Georgia. The spots at which the clouds are most likely to form can be fixed quite definitely by the statistics of the past twenty-five years. Owing to their eastward movement, at the rate of from 10 to 30 miles per hour, the whole area of the Atlantic coast States is liable to be traversed by a series of storms in the course of an afternoon, each of which is most severe in a certain central path, apparently beneath the highest portion of its cloud, while between the paths of any two neighboring storms there is a region where little or no rain falls on that day, although it may receive some on the next occasion. The presence of these so-called local thunderstorms has a slight effect upon the barometric pressure, as shown by violent and very rapid oscillations on the self-registers, but as these last but a few minutes at most, they are not likely to be observed by the use of the ordinary mercurial barometer; the aneroid is far more sensitive, and one that records by delicate optical methods shows a continual state of oscillation within a very narrow range. The wind and cloud, temperature, and especially the lightning, thunder, rain, and hail are the items demanding most careful observation and by means of which we may plot the progress of each storm, and shall, eventually, be able to predict their arrival at any place. If all the telephone and telegraph stations within a distance of 50 miles northwest and southwest of New York, Philadelphia, Washington, or any other city on the Atlantic coast were organized into a system for the immediate information of the occurrence of a thunderstorm, or even of thunder alone, the Central Office would be able to chart the location and early movement of the storm in a few minutes and predict quite exactly the time and the style of its arrival at any point. Of course, the prediction will not be in advance of the storm by more than three hours at the most, but even that amount of forewarning would be very useful in many cases.

A HIGH RAINBOW.

Mr. Sydney T. Moreland, of Lexington, Va., communicates to Nature (June 16, Vol. LVIII, p. 151) a note on a high rainbow observed on Sunday afternoon, May 29, at his residence. The sun was about an hour and a half high, at 5:40 p. m., local time (so called by him, but perhaps more accurately seventy-fifth meridian, or eastern time). The bow was in the west about 70° from the horizon, with its convex side to the sun; the colors were fairly well brought out, the red being on the convex side and the violet on the concave side. There were but very few thin clouds and no rain.

Halo phenomena in the daytime attending the sun are much more common than is ordinarily supposed. They can easily be detected by examining the region about the sun, not with the naked eye and direct vision, but either through a neutral tint glass or by looking at the reflection of the sky-light in a basin of water.

We must commend Mr. Moreland and all interested in the subject to the article by Rev. K. Schipps in the MONTHLY WEATHER REVIEW, July, 1897, pp. 294–296, and also to the corresponding note by the Editor on pp. 305–306. Apparently the rainbow observed by Mr. Moreland was a circumzenithal horizontal arc tangent to the halo of 46°, while the halo itself was invisible. These halos are due to ice needles in the upper layers of the air and may attend storms without indicating any approaching change in the weather.